

SANLunMgr. Service that maintains the LUN assignments.

SANManagerService. Service that maintains the SAN topology and attribute information.

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SANQueryEngine. Generic service that maintains a list of queries to be performed against a set of inband and outband agents and performs the queries through the SANAgentScanners and Outband Scanners.

SANStorAuto. Service that maintains the file monitoring and extension policy. Receives events from the SANAgentFSMonitor agent and performs the extension actions through the SANAgentFSExtend.

The agents 24 provide serve as proxies for the manager, providing services such as host file system monitoring, implementation of LUN assignment (e.g., via masking of non-assigned LUNs), and, as noted previously, discovery of host, storage device and/or interconnect fabric components connected to the host on which the agent resides.

Each of the illustrated agents includes an agent framework and several subagents, though alternate divisions of functionality may be utilized in other embodiments. A subagent represents a major service or function. Such a service or function can relate, for example, to host LUN masking via a host Device Driver, as discussed in more detail below. Alternatively, a subagent

can scan a host attributes. In one embodiment of the invention, an object oriented programming language, such as, Java, is utilized for implementing the agent framework and subagents.

In the illustrated embodiment, the agents provide the services listed below. Greater or fewer
5 services may be provided in agents of alternative embodiments:

SANAgentDiskPool. Service that receives LUN assignments from the SANLunMgr service and sends the requests to the SAN Disk Manager Agent Interface.

10 *SANAgentFSExtend.* Service that receives extension requests from the SanStorAuto service and extends the specified file system to the specified physical volumes.

SANAgentFSMonitor. Service that monitors the File System utilization and posts events if the monitoring policy is exceeded.

15 *SANAgentHostQuery.* Service that sends host information to the Host Manager Service. Maintains a heartbeat healthcheck with the Host Manager Service.

20 *SANAgentInbandChangeAgent.* Service that receives events from the Event Scanner and sends the information to the Event Correlator Service. Maintains a heartbeat healthcheck with the Event Correlator Service.

SANAgentScanner. Service that receives scan requests from the Query Engine, sets up the environment for the scanner executables, executes the scanners and returns the results.

5 *SANAgentScheduler.* Service used by the other agent services, which maintains a schedule of activity requests and initiates actions.

SdaDiskPool. Executable that performs LUN assignments at a platform dependent level. Some platforms require at least one filter device driver to mask unavailable LUNs at boot. Dependent upon the specifics of the platform, the filter fails attempts by the host file system to mount unassigned LUNs and, thereby, prevents I/O with them.

Msdiscover. Executable that performs Management Server queries to the switches in order to obtain the topology information.

Sandiscover. Executable that performs operating system queries to the managed host and SCSI queries to the endpoint devices in order to obtain attribute information.

Event & EventDaemon, Event Protocol Driver (AIX). Executable and daemon that
20 perform HBA queries in order to obtain event information.

Referring back to FIGURE 4, the manager 20 and each agent, such as the agent 24, can run on platforms having different operating systems, such as, Windows NT, Solaris, etc. Further, the manager can communicate with an agent by utilizing object request broker-based (ORB-based)